Trees and The Nation

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

OREGON FORESTRY

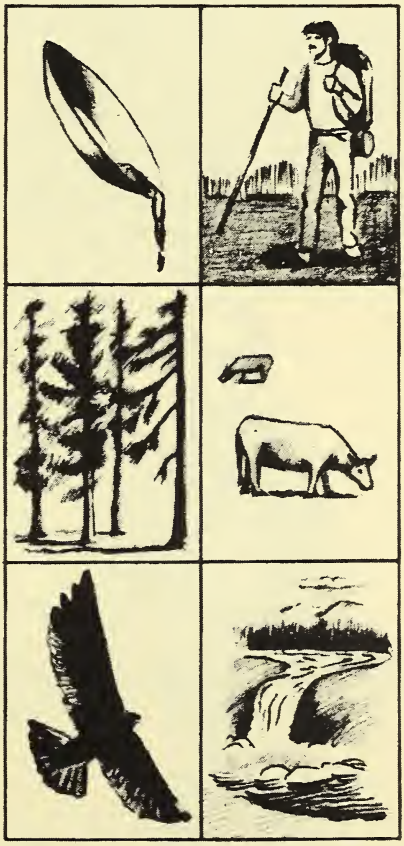
U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

Trees and The Nation

Since colonial times the Nation has grown and prospered because of its people and its vast natural resources. Today, public land managers seek to balance and enhance the use of the natural resources on publicly-owned forest lands. One of these resources – trees – is renewable.

In the Pacific Northwest, trees are a dominant part of the environment. They provide shelter and food for wildlife, stabilize the soil, assure pure and productive streams, and produce harvestable timber. Through wise management and research, the Nation's forests can become even more productive. One way to do this is by genetically improving forest trees, and assuring that these improved trees are planted in the most suitable areas.

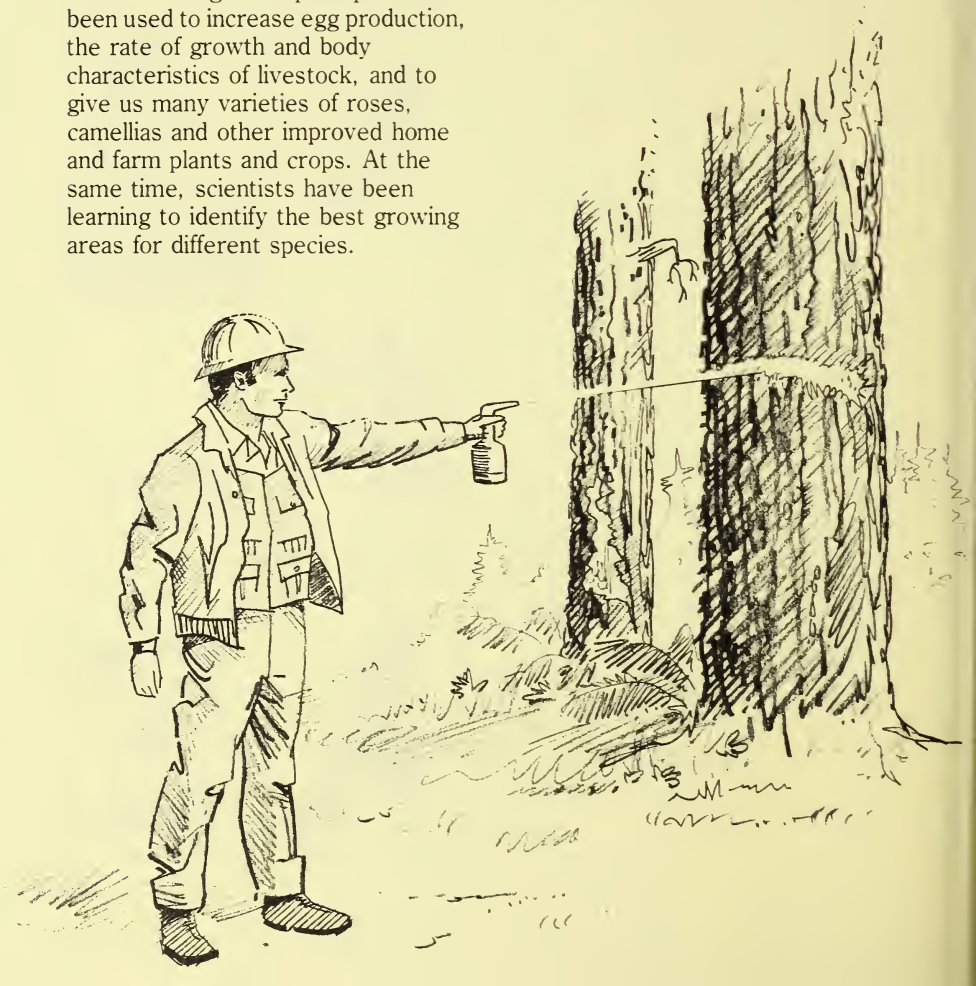
Our Nation depends on wood for construction of homes and schools, for paper, plastics and chemicals, and for a myriad of other products we all take for granted. The demand for all these commodities is expected to increase in the future, even as foresters face a decreasing land base from which to produce timber crops. To meet this challenge, foresters are working to improve the physical and growth traits of trees. They also study tree growth and adaptability so the best trees can be planted where they will be most productive. Through these efforts our forests will continue to be healthy and productive.



Like people, trees in the forest come with varying characteristics, even within the same species. Some are tall, some short; some are large, others small; some grow fast while others grow slowly; some retain their dead limbs, others shed them. By selective tree breeding, various desirable characteristics can be "put" into new, super trees – trees better suited to meet the Nation's needs.

The principles of knowing where to grow specific plants and animals, and then improving them by selective breeding, or manipulating their heredity, have long been known and used. These genetic principles have been used to increase egg production, the rate of growth and body characteristics of livestock, and to give us many varieties of roses, camellias and other improved home and farm plants and crops. At the same time, scientists have been learning to identify the best growing areas for different species.

While trees follow the same laws of nature and genetics as other plants, they present us with unique problems and differences not encountered with most other cultivated species. If an annual agricultural crop does not perform well, the problem can be corrected within a year by replanting with a better crop. Trees require a long time to reach maturity. Most commercial (marketable) tree species of the Pacific Northwest are grown for 60 to 120 years. Failure to plant each tree seedling in its best suited location may result in large economic losses due to lost vigor, lower growth rates, and decreased wood fiber.



So What Is Done?

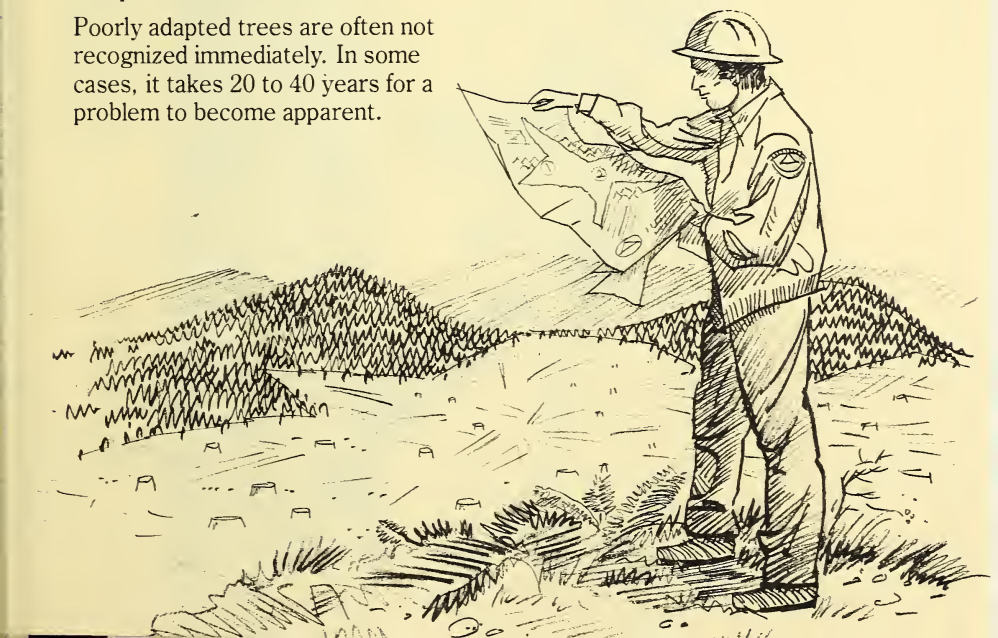
In a tree improvement program, selected parent trees with desired characteristics are interbred. Those offspring with desired traits are then used to further develop the desired qualities. With each succeeding generation, the selection process reinforces the desired traits more strongly.

All living things adapt to survive and grow in certain environmental conditions. Trees are no different. The trees of the Pacific Northwest have adapted to grow best and to survive over long periods of time within a specific range of environmental conditions, called "growing zones." If trees are moved from (or even within) the growing zones to which they have become adapted, into different growing conditions, there is a risk that they will not grow acceptably, and may even fail to reach harvest age. Therefore, foresters are studying the growing zones of trees to be able to assure each tree is planted in its best "adapted" location.

Poorly adapted trees are often not recognized immediately. In some cases, it takes 20 to 40 years for a problem to become apparent.

Unadapted trees seldom die suddenly. Many grow and appear normal for many years before symptoms develop. After years of apparent healthy growth, unadapted trees may be damaged by frost or drought, or may succumb to insect and disease attacks that might not affect normal, adapted trees. Timely study and research can save millions of dollars and years of growing time, plus provide improved products and better, healthier trees.

Projects for tree improvement have been initiated for 21 conifer species including: Douglas-fir, sugar pine, ponderosa pine, western himlock, western white pine, coastal redwood, lodgepole pine and white fir and two deciduous trees – black cottonwood and red alder. Many of these projects have been developed as tree improvement cooperatives. State and federal agencies, county governments, private forestry companies, and universities have combined efforts to jointly improve commercial tree stock.



How It's Done...

In the past, most tree seed for reforestation has been collected from natural stands of timber. Tree seed zones were identified to ensure that the seed was planted in areas where seedlings were highly adapted to the environment. These tree seed zones were defined by foresters using field experience and research data. The guiding principle for this method at the time was "local is best."

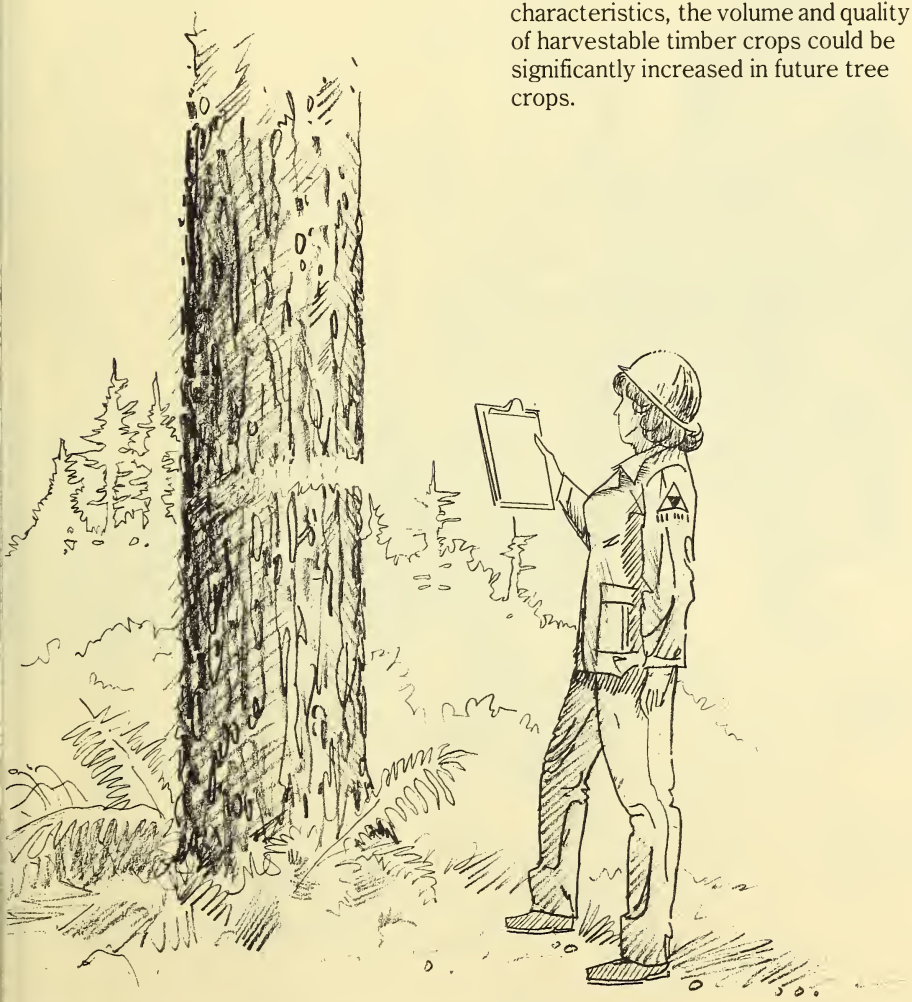
To prevent future plantation failure from use of seed from the wrong source, the states of Oregon and Washington have established tree seed certification agencies to monitor the collection and processing of tree seed. If requested by the collector, tree seed can be certified by these agencies so that the correct identification of its geographic origin is assured.

The Forest Geneticist's Role

One job of the forest geneticist in tree improvement is the investigation of the interactions of forest trees with their environment. Knowledge of both the trees and the environment allows the forest geneticist to determine and establish seed collection zones, based on studies indicating that seedlings grown from seed collected from any one particular zone grow best if planted in that zone.

In addition to identifying seed zones and adapted populations, the forest geneticist also identifies those trees having traits which lead to more useful timber crops. Qualities looked for include faster growth, straight stems, and dense, strong, knot-free wood. Other desirable characteristics include small limbs, even form and shape, and natural resistance to drought, disease, and insect and animal damage.

Through controlled interbreeding of individual trees with the desired characteristics, the volume and quality of harvestable timber crops could be significantly increased in future tree crops.



Forest geneticists are also establishing test areas to identify trees with the greatest growth and most desirable form characteristics. Called evaluation plantations, these test areas can be seen in scattered locations in the forest. They consist of several acres of planted trees, fenced to prevent animal damage. Every tree in the plantation is identified by number, and is measured periodically.

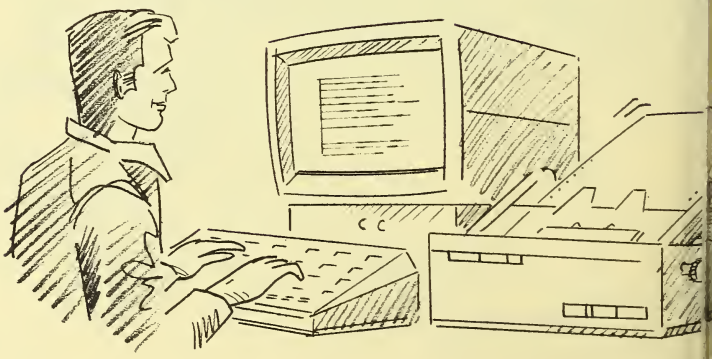
Using computers and statistical analysis techniques, data from these plantations help identify both faster-growing individual trees and the best biological breeding zones for a particular population of trees.

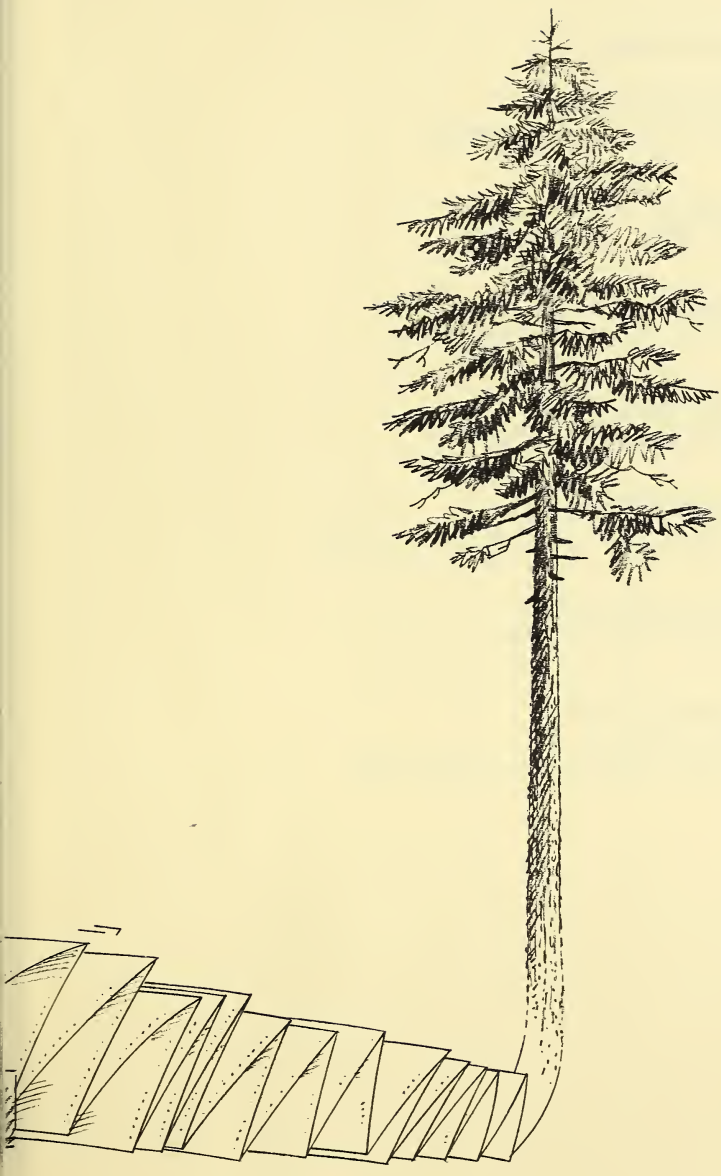
As more data is collected and our knowledge increases, these breeding zones will be redefined to describe the area of maximum adaptation for particular groups of trees. This process will reduce the potential for losses from unadapted trees, and will increase the efficiency of reforestation.

The final step in the tree improvement process is producing large amounts of tree seed for reforestation. The best trees identified in the studies are selected to produce this seed, and to be the parents of the next generation of forests. These parent trees are established in special plantations called seed orchards.

The tree improvement process is a coordinated effort between private land-owners and public agencies. The formal results of these efforts – tree improvement cooperatives – are set up to locate, test and produce genetically superior tree seedlings. These seedlings will stock healthier, productive new forests.

Within the next few years, all reforestation in Pacific Northwest Forest will be done using adapted, genetically superior tree seedlings, thus helping to meet the Nation's growing demands for adequate supplies of timber and the wide variety of other critical forest resources.





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